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(71)Applicant : KURITA WATER IND LTD

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(72)Inventor : IMAI KAZUO

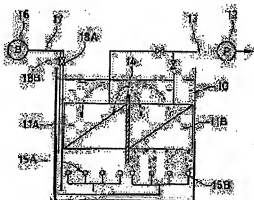
SAWADA SHIGEKI

(54) IMMERSION MEMBRANE APPARATUS

(57)Abstract:

PURPOSE: To effectively peel the non-filterable substance bonded to a membrane surface.

CONSTITUTION: In an immersion membrane apparatus wherein membrane units 11A, 11B are immersed in the liquid of a treatment tank 10 and the filtered treated water transmitted through the membranes of both units is obtained, the membrane units 11A, 11B are arranged in the liquid of the tank so as to be separated by a partition plate 14 and air diffusing devices 15A, 15B are individually installed under the individual membrane units and made alternately operable.



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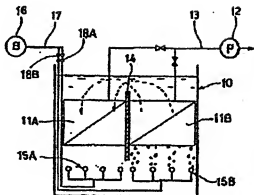
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(71) 【出願人】

【識別番号】 000001063

【氏名又は名称】 栗田工業株式会社

【住所又は居所】 東京都新宿区西新宿 3 丁目 4 番 7 号

(72) 【発明者】

【氏名】 今井 和夫

【住所又は居所】 東京都新宿区西新宿 3 丁目 4 番 7 号 栗田工業株式会社内

(72) 【発明者】

【氏名】 沢田 実樹

【住所又は居所】 東京都新宿区西新宿 3 丁目 4 番 7 号 栗田工業株式会社内

(74) 【代理人】

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(71) [Applicant]

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[Name] KURITA WATER INDUSTRIES LTD. (DB 69-055-5503)

[Address] Tokyo Shinjuku-ku Nishishinjuku 3-4-7

(72) [Inventor]

[Name] Imai Kazuo

[Address] Inside of Tokyo Shinjuku-ku Nishishinjuku 3-4-7 Kurita Water Industries Ltd. (DB 69-055-5503)

(72) [Inventor]

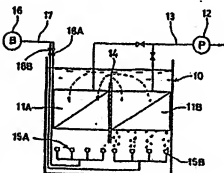
[Name] Sawada Shigeki

[Address] Inside of Tokyo Shinjuku-ku Nishishinjuku 3-4-7 Kurita Water Industries Ltd. (DB 69-055-5503)

(74) [Attorney(s) Representing All Applicants]

【目的】 膜面に付着した汚濁物を膜面から効果的に剥離する。

【構成】 処理槽 10 の液中に膜ユニット 11 を浸漬し、膜を透過した濾過液を水を得る浸漬装置において、複数の膜ユニット 11A、11B を液中の仕切板 14 で隔てて槽内液中に配置すると共に、その個々の膜ユニットの下方に個々に空気散布器 15A、15B を設け、空気散布を交互に作用可能にする。



【特許請求の範囲】

【請求項 1】 処理槽の液中に膜ユニットを浸漬し、膜を透過した濾過液を水を得る浸漬装置において、複数の膜ユニットを液中の仕切板で隔てて槽内液中に配置すると共に、その個々の膜ユニットの下方に個々に空気散布器を設け、空気散布を交互に作用可能にしたことを特徴とする浸漬装置。

【発明の詳細な説明】

【0001】

【産業上の利用分野】 この発明は、平膜を複数枚積層した膜層体や、中空糸膜を平面状、或いはすだれ状にした膜エレメントを複数枚積層した膜層体や、管状膜を複数本並行に積層したものを膜ユニットとして用いた浸漬装置に関する。

[Patent Attorney]

(57) (Abstract)

[Objective] Rejected matter which deposits in film surface it peels off from film surface in the effective.

[Constitution] As it soaks membrane unit 11 in liquid of treatment tank 10, separating membrane unit 11A, 11B of multiple with partition 14 in liquid in permeation membrane module which obtains the filtered water which transmitted membrane, it arranges in tank internal liquid, it provides air disperser 15A, 15B individually in downward direction of individual membrane unit, makes air disperser alternately operation possible.

[Claim(s)]

[Claim 1] As it soaks membrane unit in liquid of treatment tank, separating membrane unit of multiple with partition in liquid in permeation membrane module which obtains the filtered water which transmitted membrane, it arranges in tank internal liquid, the permeation membrane module which designates that it provides air disperser individually in the downward direction of individual membrane unit, air disperser alternately operation makes possible as feature.

[Description of the Invention]

[0001]

[Field of Industrial Application] As for this invention, laminate which flat membrane multiple sheet is laminated and, laminate which membrane element which hollow fiber membrane is made flat surface or the other multiple sheet is laminated and, it regards permeation membrane module which uses those which tubular membrane multiple in parallel are connected as

[0002]

【従来の技術】 処理槽の液中に上述した膜ユニットを浸漬し、膜ユニットの内部を吸引して膜を透過した透過処理水を有する透過膜装置は従来から公知である。又、膜の下側に散気装置を設け透過水を供給させることも公知である。

[0003]

【発明が解決しようとする課題】 この透過膜装置を運転して膜風通を行うと、膜面には蛋白分極層、ゲル層、ケー層などの非透過物質が付着する。そして、非透過物質の厚さが増すと透過抵抗が増大し、透過圧力が高まって透過効率は著しく低下する。このため膜ユニットの下側に散気装置を設け、一定時間膜風通運転を行ったら、又は膜風通運転中に一定透過圧力になったら、運転を中止して逆洗を行うが、この逆洗の前後に散気装置を作動し、膜ユニットの下面主体に下から気泡を供給し、膜の向きを上向する気泡と、上向水流の両方から膜面に付着した非透過物質を剥離する効果がある。この場合、膜ユニットの回りには膜の下内面側に設置する列状スペースを設けることが必要で、処理槽内への膜の充填率がその列状スペース分だけ減少することになる。

[0004]

【課題を解決するための手段】 そこで本発明は、処理槽の液中に膜ユニットを浸漬し、膜を透過した透過処理水を有する透過膜装置において、複数の膜ユニットを液中の仕切板で隔てた複数の内室に配置すると共に、その複数の膜ユニットの下側に順番に散気装置を設け、散気装置を交互に作動開始にしたことを特徴とする。

[0005]

【実施例】 図示の各実施例において、10は処理槽で、処理槽の液中には膜ユニット11が浸漬しており、ポンプ12を接続した吸引管13が膜ユニットの内部を吸引し、処理槽内の液中で、膜ユニット11を透過したものを透過処理水として排水する。膜ユニットは、前述したように平面の複数の

membrane unit.

[0002]

[Prior Art] Membrane unit which description above is done was soaked in liquid of treatment tank, inside of membrane unit was absorbed and permeation membrane module which obtains filtered water which membrane was transmitted is public knowledge from until recently. air disperser is provided in bottom of also, membrane and also fact that the filter cake is exfoliated is public knowledge.

[0003]

[Problems to be Solved by the Invention] Driving this permeant on membrane module, when it does membrane filtration, concentration polarized layer, gel layer and the cake layer or other rejected water deposit in film surface. When and, thickness of rejected matter increases, filtration resistance increases, the filtration pressure increases and filtration efficiency decreases considerably. Because of this in downward direction of membrane unit air disperser to provide, When constant time membrane filtration operation is done, or in membrane filtration operation becomes fixed filtration pressure, discontinuing driving, it does reverse washing, but air disperser it operates on front and back of this reverse washing, in bottom surface entirety of membrane unit pours the gas bubble from under, rejected matter which with shear stress of gas bubble and upper direction water stream which between membrane and upper direction are done deposits in film surface it is necessary to peel off. In this case, liquid of inside tank downwardly directed stream doing the around membrane unit, being necessary to maintain countercurrent space which circulates fill factor of membrane to inside treatment tank just countercurrent space portion means to decrease.

[0004]

[Means to Solve the Problems] Then as this invention soaks membrane unit in liquid of treatment tank, separating membrane unit of multiple with partition in liquid in permeation membrane module which obtains filtered water which transmitted membrane, arranges in the tank internal liquid, it provides air disperser individually in downward direction of the individual membrane unit, air disperser alternately it designates that it makes operation possible as feature.

[0005]

[Working Example(s)] In each Working Example in illustration, 10 with treatment tank, membrane unit 11 is soaked in liquid of treatment tank, suction pipe 13 which connects pump 12 absorbs inside of membrane unit, water sample does in starting liquid inside the treatment tank, with those which

膜層体、又は中空糸膜を平面状、或いはすだれ状にした膜エレメントの積層体。又は管状膜を積層体状に積層したものである。

[0006] 図1の実例では、処理槽10内に2つの膜ユニット11A、11Bを上流が液面下の仕切板14で隔てられ隣接して設置されており、各膜ユニット11A、11Bの下方にはそれぞれに空気散布器15A、15Bが設けられている。4つの空気散布器15A、15Bは共通のプロワー16に分岐管17で接続し、管に設けた開閉弁18A、18Bで個々に作動できるようにになっている。膜透過運転を中止し、逆洗を行う際には開閉弁18A、18Bを交互に開閉し、例えば空気散布器15Aから15分間、気泡を膜ユニット11Aに送り、次の15分は空気散布器15Bから気泡を膜ユニット11Bに送り、これを繰り返す。これにより空気散布器15Aから浮上する気泡によって膜ユニット11Aの膜面に付着した汚染物質は気泡と上向き水により膜ユニット11Aの膜面から剥離し、気泡と上向き水により膜ユニット11Aの膜面には下向き水が流れて、この下向き水によって膜面に付着した汚染物質が剥離される。空気散布器15Bが作動しているときは上記とは逆で膜ユニット11Bの膜面に付着した汚染物質は気泡と上向き水により膜面から剥離し、膜ユニット11Aの膜面に付着した汚染物質は膜面に流れた下向き水で膜面から剥離する。尚、気泡の運転を中止して行っても、膜の運転中に行ってもよい。

[0007] 図2の実例では、処理槽10内に4つの膜ユニット11A、11B、11C、11Dを3枚の仕切板14A、14B、14Cで隔てられ隣接して設置されており、各膜ユニットの下方にはそれぞれに空気散布器15A、15B、15C、15Dが設けられている。4つの空気散布器は共通のプロワー16に分岐管17で接続し、分岐管に設けた4つの開閉弁18A、18B、18C、18Dで4つの空気散布器を個々に作動させることができる。膜透過運転を行っている間、或いは運転を中止し、逆洗の前段に開閉弁を操作し、例えば空気散布器15A、15B、15C、15Dの順に15分間作動させたり、或いは15Aと15C、15Bと15Dを15分間交互に作動させる。作動している空気散布器の上の膜ユニットの膜面には気泡による上向き水が流れて、気泡と上向き水が膜面に付

transmitted membrane unit 11 as filtered water. As for membrane unit, you may mention carrier, laminate of multiple sheet of the flat membrane, Or laminate of multiple sheet of membrane element which hollow fiber membrane is made thereof surface or rayon, Or it is something which tubular membrane multiple in parallel is connected.

[0006] With Working Example of Figure 1, inside treatment is as follows: separating the 2 membrane unit 11A, 11B with partition 14 under liquid surface, it is arranged in adjacent, these air disperser 15A, 15B is provided individually in downward direction of each membrane unit 11A, 11B. You connect air disperser 15A, 15B of 4 to common blower 16 with manifold 17, you are designed in such a way that it can be operated individually with opening and closing valve 18A, 18B which is provided in tube. membrane filtration operation is discontinued, opening and closing valve 18A, 18B is opened and closed alternately you front and back which does reverse washing, 15 min and gas bubbles poured to membrane unit 11A from for example air disperser 15A, following 15 min pour the gas bubble to membrane unit 11B from air disperser 15B, repeats this. Because of this upwards flow occurs between membrane of membrane unit 11A due to the gas bubble which floating is done from air disperser 15A, rejected matter which deposits in film surface of membrane unit 11A with gas bubble and up, updirection water stream peels off from film surface, downwardly directed stream occurs simultaneously between membrane of membrane unit 11B, rejected matter which deposits in film surface with this downward water stream is exfoliated. When air disperser 15B operates, being opposite to description above, the rejected matter which deposits in film surface of membrane unit 11B peels off from the film surface with gas bubble and upper direction water stream, rejected matter which deposits in film surface of membrane unit 11A peels off from film surface with the downward water stream which it occurs between membrane. Furthermore, diffused air discontinuing driving membrane, also doing it may do on on stream of membrane.

[0007] With Working Example of Figure 2, inside treatment is as follows: separating membrane unit 11A, 11B, 11C, 11D with three partition 14A, 14B, 14C and is arranged in adjacent, air disperser 15A, 15B, 15C, 15D is provided individually in downward direction of each membrane unit. You can connect air disperser of 4 to common blower 16 with the manifold 17, air disperser of 4 you can operate individually with opening and closing valve 18A, 18B, 18C, 18D of 4 which is provided in manifold. While doing membrane filtration operation, or it discontinues driving, operates opening and closing valves front and back of reverse washing, 15 min address operates in order of the for example air disperser 15A, 15B, 15C, 15D, or 15A and 15C, 15B and 15D operates in 15 min arm alternation.

想した非透過物質を剥離し、作動していない気液界面の上の膜ユニットの間には下向き流が生じ、この下向き流が膜面に付着した非透過物質を膜面から剥離する。

【0000】

【発明の効果】以上で明らかのように、気液界面を交互に作動することで、作動している気液界面の上の膜ユニットの間には気泡による上向き流が生じ、気泡と上向き流とにより膜面に付着した非透過物質を剥離する。そして、作動を中止している気液界面の上の膜ユニットの間には下向き流が生じ、この下向き流が膜面に付着した非透過物質を剥離する。従って、下向き流を生じさせる対流スペースを膜ユニットの間に設ける必要がなくなるので、処理量への膜光利用率が高まる。又、同じ数の膜ユニットを光照射する場合、使用する均流槽の大きさは大幅に小型化する。

【図面の簡単な説明】

【図1】本発明の強流膜装置の第1実施例の断面図である。

【図2】本発明の強流膜装置の他の1実施例の断面図である。

【符号の説明】

- 10 処理槽
- 11A 膜ユニット
- 11B 膜ユニット
- 11C 膜ユニット
- 11D 膜ユニット
- 12 ポンプ
- 13 吸引管
- 14 仕切板
- 14A 仕切板

Between membrane of membrane unit on air disperser which operates upwards flow due to gas bubble occurs, rejected matter where gas bubble and upper direction water stream deposit in film surface peels off, downwardly directed stream occurs between membrane of membrane unit on air disperser which does not operate there rejected matter where this downward water stream deposits in film surface peels off from the film surface.

【0008】

[Effects of the Invention] Way it is clear at above, air disperser by fact that it operates alternately, between membrane of membrane unit on air disperser which operates upwards flow due to gas bubble causes, rejected matter which deposit in film surface with gas bubble and upper direction water stream peels off. And, downwardly directed stream occurs between membrane of membrane unit on air disperser which discontinues operation rejected matter where this downward water stream deposits in film surface peels off. Therefore, because necessity to maintain countercurrent space which causes the downwardly directed stream between membrane unit is gone, membrane fill factor to treatment tank increases. greatly miniaturization it does size of treatment tank which when it is filled, uses the membrane unit of also, same number.

【Brief Explanation of the Drawing(s)】

[Figure 1] It is a cross section of 1st Working Example of permeation membrane module of this invention.

[Figure 2] It is a cross section of other 1 Working Example of permeation membrane module of this invention.

【Explanation of Reference Signs in Drawings】

- 10 treatment tank
- 11A membrane unit
- 11B membrane unit
- 11C membrane unit
- 11D membrane unit
- 12 pump
- 13 suction pipe
- 14 partition
- 14A partition

USF 092773

JP 55271 Machine Translation - FirstPass

14B 仕切板

14C 仕切板

15A 散気装置

15B 散気装置

15C 散気装置

15D 散気装置

16 ブロー

17 分岐管

18A 開閉弁

18B 開閉弁

18C 開閉弁

18D 開閉弁

14B partition

14C partition

15A air disperser

15B air disperser

15C air disperser

15D air disperser

16 blower

17 manifold

18A opening and closing valve

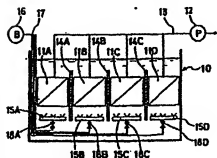
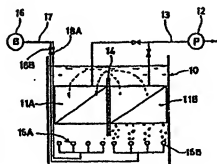
18B opening and closing valve

18C opening and closing valve

18D opening and closing valve

(図1)

[Figure 1]



USF 092774

9271 Machine Translation - FirstPass

[圖2]

[Figure 2]

USF 092775